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AUTHOR Lang, Thomas
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ABSTRACT

Several intermediate performance objectives and corresponding criterion measures are listed for each of 15 terminal objectives for a basic automotive body repair and refinishing course. The materials were developed for a two-semester (2 hours daily) course for organized classroom and shop experiences designed to enable the student to develop skills required by an auto body mechanic, refinisher, and painter. Instruction includes use of hand and power tools, electric welding, gas welding and cutting, spot welding, metal shaping, alignment and straightening, metal preparation, filling, surface preparation, and painting. The titles of the 15 terminal objectives sections are Orientation; Youth Development; Safety; Body Construction; Hand Tools; Power Tools; Gas Welding Equipment--Maintenance and Adjustments; Gas Welding, Flame Cutting, and Torch Brazing Procedures; Metal Bumping and Dinging; Metal Filling (Solder); Metal Filling (Plastic); Masking; Surface Preparation; and Care and Operation of Spray Gun Equipment. (This manual and 54 others were developed for various secondary level vocational courses using the System Approach for Education (SAFE) guidelines.) (HD)

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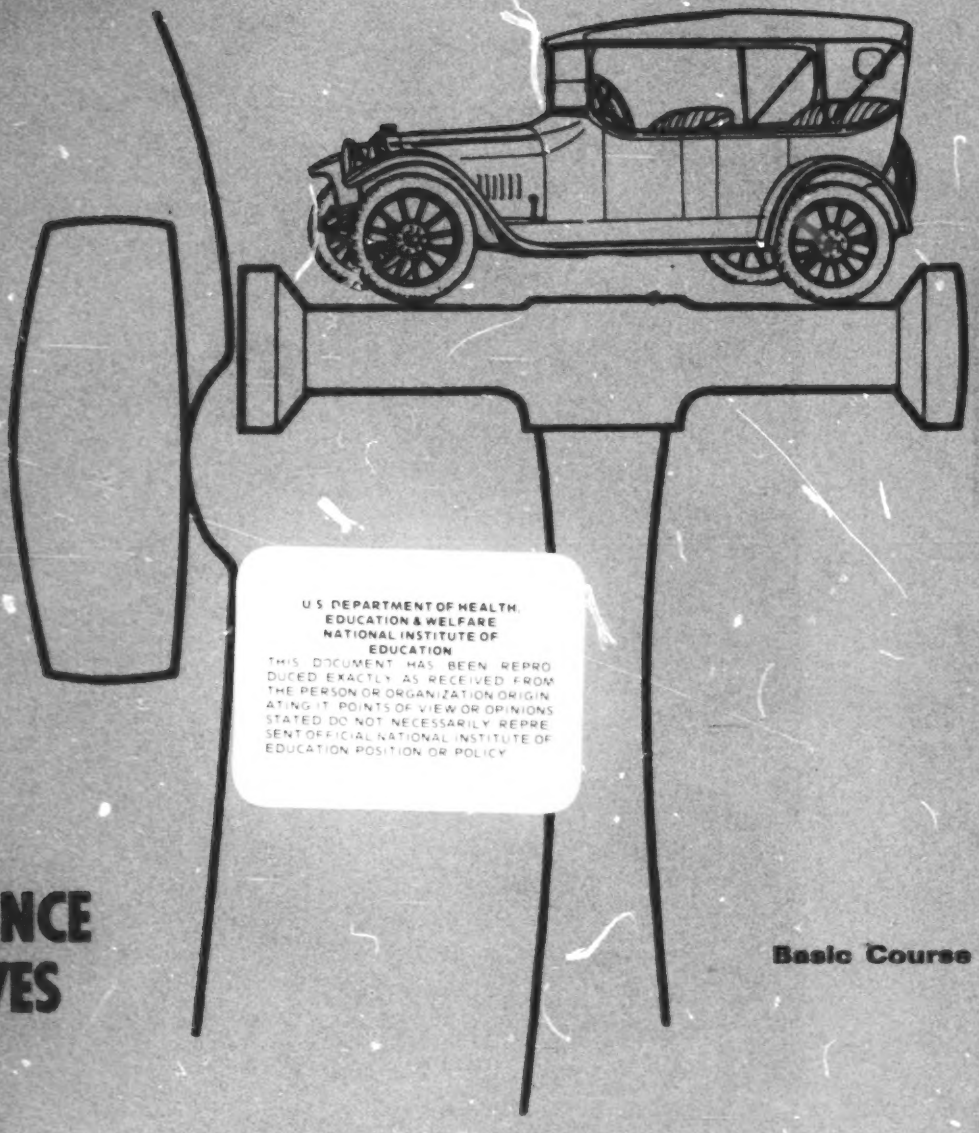
Automotive Body Repair



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PERFORMANCE OBJECTIVES

Basic Course

CE 010 968

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Duval County Public Schools

July, 1975

A C K N O W L E D G E M E N T S

This manual was developed using System Approach For Education (SAFE) guidelines.

Appreciation and recognition are extended to the following educators who have assisted in the preparation of this manual:

Mr. Thomas Carter, Coordinator
School Industry Education

Mr. Aaron Twiggs, Coordinator
School Industry Education

Mr. Joseph Killough, Coordinator
School Industry Education

Mr. Charles Downing, Supervisor
Vocational-Technical Education

The following educator participated as the writer of this manual:

Mr. Thomas Lang, Instructor

Cover design and printing by Chester Seivert

Typist: Cathy Boatright

AUTOMOTIVE BODY REPAIR AND REFINISHING - BASIC

ACCREDITATION NUMBER: 9033

LENGTH OF COURSE: 2 Semesters

TIME BLOCK: 2 Hours Daily

COURSE DESCRIPTION

Organized classroom and shop experiences designed to enable the student to develop skills required by an auto body mechanic, refinisher and painter. Instruction includes use of hand and power tools, electric welding, gas welding and cutting, spot welding, metal shaping, alignment and straightening, metal preparation, filling, surface preparation and painting. Safety is emphasized in all phases of instruction. Students are encouraged to participate in the activities of the Vocational Industrial Clubs of America.

AUTOMOTIVE BODY REPAIR & REFINISHING - BASIC

Syllabus of Terminal Performance Objectives:

1.0 - Orientation

2.0 - Youth Development

3.0 - Safety

4.0 - Body Construction

5.0 - Hand Tools

6.0 - Power Tools

7.0 - Gas Welding Equipment - Maintenance & Adjustments

8.0 - Gas Welding, Flame Cutting, and Torch Brazing Procedures

9.0 - Metal Bumping and Dinging

10.0 - Metal Shrinking

11.0 - Metal Filling (Solder)

12.0 - Metal Filling (Plastic)

13.0 - Masking

14.0 - Surface Preparation

15.0 - Care and Operation of Spray Gun Equipment

COURSE AUTOMOTIVE BODY REPAIR AND REFINISHING - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0 — ORIENTATION

The student will demonstrate knowledge of career opportunities in the automotive body repair field and related fields and other related activities according to the student handbook by scoring satisfactory on each criterion measure of the IPO's at its given acceptable percentage.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
1.1	Given a list of job titles in the automotive field, the student will select with 100% accuracy the titles related to automobile body repairing and refinishing	1.1	Check eight job positions in the automotive body repairing and refinishing field. a. general mechanic b. auto body shop foreman c. writer estimator d. body repairman e. spray painter (refinisher) f. body shop owner g. vehicle salesman h. parts manager i. gas welder j. motor vehicle dealer k. truck and bus driver
1.2	The student with 80% accuracy will answer questions about student organizations available to them.	1.2	1. Name a club especially designed for the industrial education students. 2. What does V.I.C.A. mean? 3. Who can join V.I.C.A.? 4. How much does it cost to join V.I.C.A.? 5. What benefits are derived from belonging to V.I.C.A.?
1.3	The student will pass with 80% accuracy a written test on the student handbook.	1.3	1. Does the school have a dress code and does it apply to the auto body shop area? 2. How many hours are needed in classroom before students are eligible to work in the S.I.E. program? 3. How many credits are received for completing this course? 4. Where is the designated area for this class during a fire drill? 5. What is the minimum passing grade in this course?

COURSE AUTOMOTIVE BODY REPAIR AND REFINISHING - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0 (cont'd) ORIENTATION

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
1.4	The student will with 80% accuracy pass a written test on career opportunities in the transportation field.	1.4	1. Is it necessary to belong to a union? 2. What is the average hourly pay scale? 3. What are the chances for advancement? 4. What are the determining factors for advancement? 5. What is the job market for persons in the transportation areas especially auto body repair and refinishing?
1.5	The student will with 100% proficiency describe given positions of management in the school shop.	1.5	1. What are the duties of the shop foreman? 2. What are the duties of the safety foreman? 3. What are the duties of the tool room foreman? 4. What are the duties of the maintenance foreman?
1.6	Given a print of general shop area, students will locate position of fire extinguishers on the print and identify the types of fire extinguishers with 100% proficiency.	1.6	1. Locate and mark all fire extinguishers on the shop blueprint. 2. List the types of fire extinguishers located in the auto body shop.
1.7	The student will list five safety regulations applicable to auto body repair.	1.7	Write five safety regulations applying to the automotive body repairing and refinishing shop

COURSE AUTOMOTIVE BODY REPAIR AND REFINISHING - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 2.0

YOUTH DEVELOPMENT

Ninety percent of the students enrolled in the Auto Body program will be a member of the school VICA chapter and will attain 80% proficiency on a written test regarding VICA activities.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		2.0	Test attached.
2.1	The student will answer questions about VICA with 100% accuracy.	2.1	1. What does VICA mean? 2. Who can join VICA? 3. How much does it cost to join VICA? 4. What do most employers think about a student in VICA?
2.2	Students given a list of ten items will select with 85% accuracy the items that show VICA club benefits.	2.2	1. Circle eight of the items below which would be involved in VICA club participation. a. group participation b. pride in occupation c. parliamentary procedures d. public speaking e. driving f. competition g. awards h. voting i. part-time work j. social interaction
2.3	The student will demonstrate with 80% accuracy his understanding of the suggested VICA club activities.	2.3	Under each heading list 5 suggested activities in your VICA club. 1. CIVIC a. b. c. d. e. 2. EDUCATIONAL a. b. c. d. e. 3. SOCIAL a. b. c. d. e. 4. PROFESSIONAL a. b. c. d. e.

2.0 TEST

YOUTH DEVELOPMENT

1. VICA is an organization for Industrial Education students only.
   True or False.

2. What does VICA mean?

3. The official dress of the organization shall be VICA blazer, white shirt, black tie, black pants and (skirt for women) black shoes.
   True or False.

4. Should a VICA member be able to list the officers of his local club and discuss the duties of each?

5. How does your training program relate to the school system?

6. A good VICA member will participate in club projects, activities, and general service to the local club.
   True or False.

7. Regular attendance at club meetings is not necessary.
   True or False.

8. Committees of various kinds are not important in VICA.
   True or False.

9. List two types of activities VICA clubs can participate in.

   1.
   2.

10. Should all VICA members participate in the club ceremonies?
    Yes or No.

COURSE AUTOMOTIVE BODY REPAIR AND REFINISHING - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 3.0 — SAFETY

After instruction on safety practices 80% of the students will answer 75% of the questions on a criterion examination.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		3.0	See attached test.
3.1	Given problems on good housekeeping procedures, students will orally solve 90% of the questions.	3.1	Explain and demonstrate the safe housekeeping procedures in the following situations. a. oily rags on floor on gas welding equipment b. loose parts or tools on the floor c. oil or grease on the floor d. creepers, air hose, extention cords or jacks in walkways e. portable machines, equipment and projects in walkways and driveways
3.2	Students will make a list of six safety hazards in auto body shop. Examples: horseplaying, using compressed air, throwing, unguarded fans and pulleys and open solvent cans.	3.2	Identify six safety hazards in the automotive body shop.
3.3	Students will demonstrate the proper way to lift heavy objects with 100% accuracy.	3.3	Demonstrate the proper position for lifting heavy objects. Position of: 1. back 2. legs and knees 3. hands
3.4	Given instructions on eye and lung protection, the student will answer the questions in the criterion measures with 100% accuracy on goggles, respirators and gloves.	3.4	1. When there is only a slight danger to the eyes should goggles be worn? 2. Respirators are of many types, would you substitute one respirator for another? 3. Why should gloves be worn while straightening metal

TPO 3.0 - AUTOMOTIVE BODY REPAIR AND REFINISHING - BASIC

SAFETY

1. What must be done with oily rags?

2. Which of the following best describe good housekeeping in the automobile body shop?

   a. cleanliness and neatness
   b. disposal cans to receive waste
   c. a place for everything, and everything in its place
   d. all of these

3. Always clean metal filings or chips by using compressed air.
   True or False

4. After gas welding, cylinders should be left on so welding can be continued the next day.
   True or False

5. The safe way of lifting a heavy object is to keep your back straight and use the strength of your legs to do the lifting.
   True or False

6. Always use a liquid extinguisher to put out an electric fire.
   True or False

7. Name four job operations during which safety glasses should be worn.

8. What kind of safety equipment should always be worn while grinding?

   a. high top shoes
   b. wide brem hat
   c. long sleeves
   d. safety eye shield

9. Always use a CO_2 fire extinguisher to put out a lacquer solvent fire.
   True or False

10. Use a liquid fire extinguisher to put out an enamel solvent fire.
    True or False

11. Color hose on gas welding equipment denotes safety.
    True or False

12. What is OSHA? What affect does OSHA have on schools? Industry?

13. What is spontaneous combustion?

14. Why should the starting battery be disconnected on vehicles after they have been in a collision?

COURSE AUTOMOTIVE BODY REPAIR AND REFINISHING - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

BODY CONSTRUCTION

Upon completion of this unit the learner will recognize the basic types of body construction and each component part with 75% of the learners attaining a 75% or better on a written examination of the above.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		4.0	See attached test.
4.1	Given the types of body construction the learner will with 100% accuracy identify the above by answering four written questions.	4.1	1. How many basic types of body construction are in common use? a. one b. two c. three d. four 2. Does the unitized body construction provide overall body rigidity? yes or no 3. Where is the rocker panel located? a. below the rear deck b. below the doors c. below the radiator d. above the rear quarter panel 4. Describe the separate frame and body construction.
4.2	Given a list of names and locations of decorative body moldings the learner will point to the molding on a suitable practice automobile with 100% accuracy.	4.2	From the diagram and the list of decorative moldings and their locations match the number with the letter. (next page)

COURSE AUTOMOTIVE BODY REPAIR AND REFINISHING - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0 (cont'd) BODY CONSTRUCTION

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
4.3	Given a diagram showing front end sheet metal parts the learner will correctly list 18 of the 20 parts.	4.3	According to the attached diagram, list parts of the typical installation details of the front end sheet metal parts. 1. 11. 2. 12. 3. 13. 4. 14. 5. 15. 6. 16. 7. 17. 8. 18. 9. 19. 10. 20.

COURSE AUTOMOTIVE BODY REPAIR AND REFINISHING - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

HAND TOOLS

The learner will demonstrate knowledge and safety developed in the purpose and use of given hand tools with 85% of the students achieving 75% or better on a written examination.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		5.0	See attached test.
5.1	Given ten incomplete sentences concerning hand tools the student will select the correct words to complete the ten sentences with 80% accuracy.	5.1	1. The dinging hammer is used together with a _____ block to remove dents from sheet metal. 2. The surfaces of the dollies are finished in different radii, this is done so that the dolly will conform to the _____ of the panel being straightened. 3. With the adjustment the file is bent to conform to the _____ of the panel being repaired. 4. By filing the surface of the damaged panel, after dinging the work, the _____ _____ are quickly shown. 5. The _____ _____ _____ has many uses in the body shop. The most frequent use is to hold two adjoining pieces of sheet metal together for proper alignment while being welded. 6. The _____ _____ is made of close-grained maple and is designed for spreading the solder over the surface of the panel. 7. The end of a phillips type screwdriver is _____. a. fluted end b. flat grade c. pointed end with 4 grooves 8. A tool inserted in a hexagon shaped recess of a screw is _____. a. inside caliper b. allen wrench c. inside micrometer

COURSE AUTOMOTIVE BODY REPAIR AND REFINISHING - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0 (cont'd) HAND TOOLS

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		5.1	9. The main reason for using a box type wrench is _____. a. used on round unit b. greater strength c. less chance to slip from nuts 10. Hacksaw blades are made of _____. a. stainless steel b. high grade tool steel c. cast iron

TPO 5.0 - AUTOMOTIVE BODY REPAIR AND REFINISHING - BASIC

HAND TOOLS

1. A combination or pick hammer is:

   a. flat on both faces
   b. pointed on both faces
   c. flat on one side, pointed on the other

2. The surface of the dolly blocks are all of the same radii.
   True or False

3. How are file holders adjusted to different arcs?

   a. by means of a setscrew
   b. by means of a turnbuckle

4. Which are the most frequently used tools in the auto body repairman's kit?

   a. screwdriver
   b. welding torch
   c. dinging hammer and dolly block
   d. body file

5. How is the dolly used?

   a. as a hammer
   b. as an anvil
   c. in the same manner as a pry bar

6. The flat face of the hammer is used on concave surfaces.
   True or False

7. The dolly block is held loosely against the surface of the metal.
   True or False

8. Is a fender file used mostly to remove metal or to locate high and low spots?

   a. remove metal
   b. locate high and low spots

9. When using a fender file it should be pused:

   a. straight forward
   b. forward at an angle

10. After the dents have been removed by means of the dolly block and hammer, what tool is used to remove tool marks and other slight imperfections?

    a. pick hammer
    b. adjustable file
    c. power sander

COURSE AUTOMOTIVE BODY REPAIR & REFINISHING - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 6.0 — POWER TOOLS

Eighty-five percent of the learners will demonstrate knowledge and safety developed in the purposes and use of basic power tools by achieving 75% or more on each IPO criterion measure.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
6.1	Given ten evaluations concerning power tools, the learner will select true or false on the proper word or words to complete the sentences with 75% accuracy.	6.1	1. How many types of sanders are commonly used in auto body repair work? a. three b. four c. five d. seven 2. The disc-type sander is available in both the portable and the _____ shaft type. a. cycle shaft b. pneumatic shaft c. flexible shaft d. sander shaft 3. The three main types of sanders used in auto body repair work are a. rotary or disc b. oscillating c. 1. belt sander 2. pin sander 3. conventional sander 4. control sander 4. All electrical tools should be _____ for safety before using. a. cleaned b. grounded c. set d. on 5. Electric tools should never be used by an operator standing on a we floor. True or False

COURSE AUTOMOTIVE BODY REPAIRING & REFINISHING - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 6.0 (cont'd) — POWER TOOLS

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		6.1	6. Operators of grinding equipment should always wear safety goggles or a face shield. True or False 7. When spray painting a _____ should always be worn. a. hat b. face shield c. respirator d. apron 8. If one of the sight pins of a tram gauge is lower than the others, what is indicated? a. damage exists at that point b. there is no misalignment 9. Power jacks are used in automotive body repair to _____ and _____ sheet metal and frame damages. a. slide and lift b. lift and roll c. break and snap d. push and pull 10. When using chains to anchor a chassis should the chains be passed around sharp corners? yes or no
6.2	Given a disc sander or grinder, the learner will grind a panel using all safety precautions and proper disc sander or grinder procedures.	6.2	Grind a panel according to attached diagram.
6.3	The learner will identify the various types of power tools and equipment.	6.3	Circle 6 most commonly used power tools in an automotive body shop. 1. disc sander 2. poto power jacks 3. orbital sanders 4. hand drill 5. power-operated sheet metal hammer. 6. frame and body machine 7. belt sander 8. crankshaft grinder 9. bench grinder

COURSE AUTOMOTIVE BODY REPAIRING & REFINISHING - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 6.0 (cont'd) POWER TOOLS

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
6.4	Given appropriate power equipment, 75% of the learners will with 80% accuracy explain the difference and show advantages & disadvantages of electric power tools and pneumatic power tools and equipment.	6.4	1. Explain the difference between electric and pneumatic power tools and equipment. 2. Grind a panel with an electric disc sander and take all safety precautions. 3. Grind a panel with a pneumatic sander and take all safety precautions. 4. Compare the safety, weight, size, power and other general and specific characteristics of the electric and pneumatic tools. 5. Show the advantages and disadvantages of electric and pneumatic.

COURSE AUTOMOTIVE BODY REPAIRING & REFINISHING - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 7.0

GAS WELDING EQUIPMENT MAINTENANCE & ADJUSTMENT

Given 10 questions concerning gas welding equipment, the student will correctly answer 8 of them and given oxy-acetylene equipment, the student will properly set up the equipment and test it for proper operation with 100% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		7.0	1. What is the temperature produced by an oxyacetylene flame? 2. What kind of welding gas is odorless, tasteless, and dangerously explosive? 3. What two agents are required to produce acetylene gas? 4. How many pounds pressure are there in a full bottle of oxygen? 5. How many pounds pressure are there in a full bottle of acetylene? 6. What chemical is used in cylinders to keep acetylene gas safe from explosion? 7. What substance is extremely dangerous around oxygen equipment? 8. Acetylene gas should never be used in excess of how many P.S.I.? 9. What kind of eye protection should always be worn when gas welding or flame burning? 10. What is the only substance that should be used when checking for leaks on oxyacetylene equipment? Properly and safely set up acetylene equipment and test for proper operation.

COURSE AUTOMOTIVE BODY REPAIRING & REFINISHING - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 7.0 (cont'd)

GAS WELDING EQUIPMENT MAINTENANCE & ADJUSTMENT

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
7.1	Given a list of gas welding equipment parts, the learner will with 100% accuracy orally identify the parts of the gas welding unit.	7.1	With gas welding equipment parts list the learner will orally identify and show the function of each unit. 1. oxygen cylinder 2. oxygen regulator 3. oxygen hose 4. acetylene cylinder 5. acetylene regulator 6. acetylene hose 7. torch (includes: a. handle, b. mixing chamber, and c. tip) 8. eye protection 9. spark or friction lighter 10. hand truck for cylinders
7.2	Given the proper tools and a gas welding unit, 90% of the students will disassemble and reassemble the unit with 100% accuracy.	7.2	Disassemble and reassemble each unit labeling each part and explaining each operation. Use all safety precautions in disassembling and reassembling unit.
7.3	The student will with 100% accuracy orally explain the function of the regulators.	7.3	What is the function of the regulator diaphram, adjusting screw and gauges?
7.4	The student will with 80% accuracy explain the function of the gas cutting torch.	7.4	Explain and demonstrate the function of the needle valve on the cutting torch.
7.5	The student will with 100% accuracy explain safety features on the oxygen and acetylene cylinders.	7.5	Explain and demonstrate the function of the oxygen and acetylene cylinder safety device.

COURSE AUTOMOTIVE BODY REPAIRING AND REFINISHING-BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 8.0

GAS WELDING, FLAME CUTTING AND TORCH BRAZING PROCEDURES

Upon completion of a series of lectures and demonstrations on lighting and operating the oxyacetylene equipment, the student will be able to adjust the equipment, light the torch, adjust the flame, weld sample plates, cut metal with the torch, and observe all safety precautions with 80% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
8.0		8.0	Adjust the gas welding equipment, light and adjust flame as needed, do the following: a. weld sample plates assigned by instructor b. cut sample plates assigned by instructor All of the above must be accomplished while observing all safety precautions and rules.
8.1	The student will assemble the torch and adjust flame with 85% accuracy.	8.1	Properly assemble the equipment, safety light the torch and adjust the three flames and demonstrate their use. 1. carburizing flame 2. neutral flame 3. oxidizing flame
8.2	Assigned a gas welding station with all necessary equipment and materials, the student will lay heads on flat plate without filler rod with 80% proficiency.	8.2	Properly and safely lay heads on flat steel plate without filler rod with gas welding equipment.
8.3	Assigned a gas welding station with all necessary equipment and materials, the student will lay heads on flat steel plate using filler rod with 80% proficiency.	8.3	Student will properly and safely lay heads on steel plate with the use of filler rods using gas welding equipment.

COURSE AUTOMOTIVE BODY REPAIRING AND REFINISHING-BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 8.0 (cont'd)

GAS WELDING, FLAME CUTTING AND TORCH BRAZING PROCEDURES

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
8.4	Assigned a gas welding station with all necessary equipment and materials, the student will weld butt joints in the flat position with 80% proficiency.	8.4	Prepare plates of thin gage mild steel, and properly weld butt joints in the flat position using gas welding equipment.
8.5	Assigned a gas welding station with all necessary equipment and materials, the student will demonstrate 80% proficiency torch-brazing a "lapp" joint in the flat position.	8.5	Prepare plates of thin gage galvanize steel and properly torch-braze "lapp" joints in the flat position, using gas welding equipment.

COURSE AUTOMOTIVE BODY REPAIRING AND REFINISHING - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 9.0

METAL BUMPING AND DINGING

Upon completion of the unit of instruction on metal bumping and dinging 85% of the students will achieve 75% proficiency on a criterion test and will demonstrate their ability by straightening a panel using hammer, dolly block, body file any glove with 85% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		9.0	See attached test.
9.1	The student will demonstate his understanding of metal bumping and dinging with auto body panels as projects using the bumping and dinging basic straightening tools 80% of the learners will develop 85% proficiency.	9.1	1. How does using a glove aid in locating low spots on a surface? a. Your hand registers both the contour of the metal and its temperature. b. Your hand is insulated from the metal and needs to be sensitive only to the irregularities. 2. Why should a mallet (rubber, wood) be included in your dinging tools? a. permits a good distribution of force b. mode of material safer than metal c. hammer marks are not made on the surface d. correct some minor damage without injuring the paint e. none of these f. all of these 3. The pick hammer selected as a part of your minimum kit of tools has a round face which can be used for most hammering operations. The pick position of the hammer is round for its entire length and tapered to a point. True or False 4. The dolly block can be used as a/an: a. anvil b. hammer c. weight d. spoon

COURSE AUTOMOTIVE BODY REPAIRING AND REFINISHING - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 9.0 (cont'd) METAL BUMPING AND DINGING

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		9.1	5. The body file and holder is necessary to locate low and high spots in the surface and to smooth the work after the hammering is finished. T ue or False
9.2	Given a body hammer and a dolly block the student will demonstrate hammer on dolly and hammer off dolly with 85% proficiency.	9.2	1. Hammer on dolly: Place the dolly under the metal and strike a hammer blow directly on it. 2. Hammer off dolly: Place the dolly in the right spot when the hammer blow strikes, the spot will be close to but away from the spot on which the hammer blow falls.
9.3	Given an adjustable body file the student will demonstrate the proper use of the body file with 85% proficiency.	9.3	1. Demonstrate the location of high and low spots with the body file. 2. Adjust the file holder to fit the contour of the surface. 3. Push the body file forward at an angle.

TPO # 9.0 - AUTOMOTIVE BODY REPAIRING AND REFINISHING - BASIC

METAL BUMPING AND DINGING

1. Which are the most frequently used tools in the auto body repairman's kit?

   a. screwdriver
   b. welding torch
   c. dinging hammer and dolly block
   d. file

2. How is the dolly used?

   a. as a hammer
   b. as an anvil
   c. in the same manner as a pry bar

3. The flat face of the hammer is used on concave surfaces.
   True or False

4. The radius of the dolly face should be greater or less than the basic curve of the dent being straightened.

   a. greater
   b. less
   c. the same

5. When using a dinging hammer it should be used in the same manner as when driving a nail.
   True or False

6. Describe the manner in which a dinging hammer should be used.

7. The dolly block is held loosely against the surface of the metal.
   True or False

8. Is a fender file used mostly to remove metal or to locate high and low spots?

   a. remove metal
   b. locate high and low spots

9. When using a fender file it should be pushed:

   a. straight forward
   b. forward at an angle

10. After the dents have been removed by means of the dolly block and hammer, what tool is used to remove tool marks and other slight imperfections ? a. pick hammer b. adjustable file c. power sander

COURSE AUTOMOTIVE BODY REPAIRING AND REFINISHING - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 10.0

METAL SHRINKING

Upon completion of a series of lectures and demonstrations on metal encompassing the elasticity of metal, metal expansions, contractions, stretched or bulged metal, cold and hot shrinking, 80% of the students will be able to demonstrate with 85% accuracy on the criterion measure, written and performance test.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		10.0	See attached test.
10.1	Given tools for cold shrinking hammer and stretched metal, the student will with 85% accuracy, cold shrink a bulged area.	10.1	Cold shrink a bulged area by using a cold shrinking hammer and a dolly block in the usual manner, hammer on dolly.
10.2	The learner will with 75% accuracy shrink a bulged area by cutting slits in the bulge and allowing the edges of the slits to overlap.	10.2	By using appropriate metal cutting tools slit the metal in the bulge area and allow the edges of the slit metal to overlap and shrink the stretched area.
10.3	Given the proper tools and heating equipment the learner will with 100% accuracy heat shrink a bulged area.	10.3	Heat shrink a bulged area with the following tools and procedures. a. Tools 1. welding torch with a welding tip 2. body hammer 3. dolly block 4. medium sized sponge 5. a water container with water b. Procedures 1. arrange tools within easy reach 2. circle the bulged area 3. place nickel size circles within the circle numbering from center. 4. heat the no. 1 spot in the center cherry red with a circular motion 5. place the dolly under the cherry red spot and strike in with the hammer several times

COURSE AUTOMOTIVE BODY REPAIRING AND REFINISHING - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 10.0 (cont'd) METAL SHRINKING

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		10.3	6. Quench it immediately with the water-filled sponge 7. Repeat this operation taking the next highest spot in the stretched section until the bulge is finally shrunk 8. Exercise care to avoid "overshrinking" the panel. This will cause the metal to warp and buckle

TPO #10.0 - AUTOMOTIVE BODY REPAIRING AND REFINISHING - BASIC

METAL SHRINKING

1. How does a shrinking hammer differ from an ordinary dinging hammer?

   a. has a heavier head
   b. has a longer handle
   c. the face is cross-grooved

2. When shrinking metal with a torch, where should the heat be first applied?

   a. at the center of the area
   b. at the edge of the area

3. When shrinking sheet metal, what should be the color of the heated spot?

   a. red hot
   b. white hot
   c. straw color

4. Should the entire stretch area be heated at one time? yes or no

5. What color should the heat spot be when it is quenched with water?

   a. blue
   b. red
   c. black
   d. straw color

6. List five tools used for a hot shrinking operation.

   a._____
   b._____
   c._____
   d._____
   e._____

7. What type of motion should be imparted to the torch when a heat spot is made?

   a. up and down
   b. circular
   c. side to side

8. More heat spots are required when quenching with water.
   True or False

9. Use an oxyacetylene torch only when heat shrinking.
   True or False

10. When shrinking body metal a slight amount of overshrinking is desirable.
    True or False

COURSE AUTOMOTIVE BODY REPAIR AND REFINISHING - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 11.0

METAL FILLING (SOLDER)

The student will demonstrate his knowledge of body soldering by 80% proficiency on a written test and by performing a solder fill with 100% accuracy as judged by a rating chart as given in IPO #11.2.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		11.0	Test attached.
11.1	The student will identify the types of body solder and its properties by correctly answering 80% of the questions on a written test.	11.1	1. What is the composition of the most common mixture of body solder? a. copper and tin b. tin and lead c. lead and zinc 2. Body solder is an ideal and practical metal for filling dents. True or False 3. Why should body solder be used on body dents? a. to speed up the operation b. to fill dents that cannot be removed by other means c. heat helps to remove dents 4. Heat in a controlled form is used to apply body solder. True or False 5. Why should the flux or soldering fluid be applied to hot metal?
11.2	Given the necessary lectures and demonstrations, tools, materials, equipment and procedures, the student will, with 80% accuracy, select proper procedures from a given list and will apply body solder to a dented panel.	11.2	1. Identify the proper tools, materials and equipment for applying body solder by circling the numbers below. 1. oxyacetylene outfit 2. safety glasses 3. friction lighter 4. maple wood paddle and oil 5. soldering fluid or flux and brush 6. acid core solder 7. body solder 8. disk grinder 9. body file 10. steel wool or cloths 11. sponge and water 12. rubber squeegee 13. lead bucket 14. division bar 15. uncontrolled heat

COURSE AUTOMOTIVE BODY REPAIR AND REFINISHING - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 11.0 (cont'd) METAL FILLING (SOLDER)

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		11.2	16. welding rod 17. steel plate connectors 18. electric drill 19. power saw 20. stillson wrench 2. Select the proper procedure by number and content needed to plastic fill a dented area. 1. prepare the dented panel for solder 2. clean and tin the surface 3. add body solder onto area 4. smooth the solder with a maple wood paddle making sure the surface is slightly higher than the surrounding area. 5. Sand the solder with an open coat no. 15 or 24 grit abrasive or/and with a body file level with the original contour. 6. Apply acid core solder for tinning. 7. Apply soldering fluid to the surface. 3. Apply body solder to a dented panel by using the selected equipment, material and tools along with the selected procedure taking all safety rules and regulations under consideration. (Rating Chart Attached)

TPO 11.0 - AUTOMOTIVE BODY REPAIR AND REFINISHING - BASIC

METAL FILLING (SOLDER)

1. Which method of filling dents is faster?

   a. lead
   b. plastic

2. Solder is a mixture of what two metals?

   a. zinc and tin
   b. lead and zinc
   c. lead and tin
   d. copper and zinc

3. What is the purpose of soldering flux?

   a. helps clean the surface
   b. roughens the surface

4. When applying solder to the tinned surface, in what condition should it be?

   a. molten
   b. plastic

5. When using a disk sander to smooth the surface of solder, what grit should be used?

   a. no. 24 grit
   b. no. 240 grit
   c. no. 180 grit

6. Is it possible to apply solder to a surface if rust or paint is still on the surface?
   Yes or No

7. What is the process called for preparing the surface to receive solder?

   _____

8. Name the two materials, either of which may be used for tinning the surface.

   1.
   2.

9. Why should the soldering paddle be dipped in oil before it is used to spread solder? _____

10. In what way are damaged inaccessible areas on automobiles repaired?

    _____

COURSE AUTOMOTIVE BODY REPAIR AND REFINISHING - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 12.0

METAL FILLING (PLASTIC)

The student will demonstrate his knowledge of plastic filling by 80% proficiency on a written test and by performing a plastic fill with 100% accuracy as judged by rating sheet given in I.P.O. #12.3.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		12.0	Test attached.
12.1	The student will identify the types of plastic filler and its properties by correctly answering 80% of the questions on a written test.	12.1	1. When using plastic to fill a dent it is not necessary to featheredge the area. True or False 2. Plastic is usually applied to the surface with what type tool? a. wooden paddle b. rubber squeegee 3. A catalyst or hardener is used with plastic filler to harden the material. True or False 4. Plastic fillers harden from the inside out. True or False 5. Where should the mixing directions for any plastic material be obtained?
12.2	Given a tool list and a procedure list the student will, with 80% accuracy, choose the correct tools and procedures to plastic fill a dented panel.	12.2	A. Select the necessary tools, equipment and materials to plastic fill a dented panel. 1. disk grinder 2. #24 grit disk 3. plastic filler 4. catalyst 5. hardener 6. safety goggles 7. sandpaper (36-40-80 grits) 8. flat sheet metal 9. flat sheet glass 10. putty knife 11. rubber squeegee 12. body file 13. grater file 14. plastic filler sanding board 15. inline air sander 16. drying lamp B. Select the proper procedure by number and content needed to plastic fill a dented area. 1. Prepare the dented panel to receive plastic filler. 2. Place the desired amount of plastic filler on a clean smooth surface. 3. Mix thoroughly with the desired amount of catalyst or hardener

COURSE AUTOMOTIVE BODY REPAIR AND REFINISHING - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 12.0 (cont'd) METAL FILLING (PLASTIC)

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		12.2	4. Mix only enough plastic filler with catalyst as can be easily applied before it hardens. 5. Apply the plastic filler to a clean bare metal surface. 6. Use medium pressure to ensure a good bond by spreading an initial thin layer of plastic filler over the area. 7. Apply additional layers of filler immediately after the first layer until it is just a little higher than the surrounding surface, this will allow a little extra filling material for filling and sanding. 8. Do not return to the container any mixed plastic filler that is left over for it will harden the remaining contents. 9. Plastic fillers hardens from inside out and are generally ready for filing in about 20 minutes. 10. Low spots found in the filled area must be filled with additional plastic filler.
12.3	The student will apply plastic filler to a given dented panel with 80% proficiency as judged by given rating scale.	12.3	Apply plastic filler to a dented panel using the selected equipment, tools and materials along with the selected procedure taking all safety rules and regulations under consideration. (Rating Scale Attached)

12.0 - AUTOMOTIVE BODY REPAIR AND REFINISHING - BASIC

METAL FILLING (PLASTIC)

1. In what way should low spots in insufficiently filled surfaces be eliminated?

2. Why is the use of plastic filler on the outer edges of body panels not recommended?

3. Plastic is usually applied to the surface with what type of tool?

   a. wooden paddle
   b. rubber squeegee

4. High spots projecting through a plastic filler is objectionable.
   True or False

5. The surface can have paint and other foreign material before plastic filler is applied.
   True or False

6. Should a long flat block, board, inline file or sanding board be used in finishing plastic filler?
   Yes or No

7. Flux is not used with plastic filler.
   True or False

8. What is catalyst used with plastic filler for?

9. Leveling a body surface is very important.
   True or False

10. The grater type file is most commonly used on plastic filler.
    True or False

COURSE AUTOMOTIVE BODY REPAIR AND REFINISHING - BASIC

RMINAL PERFORMANCE
JECTIVE NO. 13.0

MASKING

Upon completion of a unit of instruction on masking, 90% of the students will achieve a score of 80% on a criterion test and demonstrate their ability by masking straight lines and curves using various sizes of masking tape and masking paper. They will score 80% on the job rating scale.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		13.0	Test attached
13.1	The student will explain the two methods of applying the masking tape to the masking paper with 100% accuracy.	13.1	1. Explain orally the two methods of applying the masking tape to the masking paper. 2. Narrow masking tape will follow a curve easier than wide masking tape.
13.2	The student will explain orally the steps used in preparing an area for masking with 80% accuracy.	13.2	1. Explain orally how to clean the area before masking. 2. Explain orally drying the area before masking. 3. Explain orally preparing upholstery for masking.
13.3	The student will demonstrate his ability when masking different shape panels and objects to select the proper width masking tape and masking paper with 80% accuracy.	13.3	1. Chrome trim, door handles and similiar ornamentation requires no paper only masking tape. True or False 2. Explain orally how to select a tape of sufficient width to cover the part as completely as possible.
13.4	Given an illustration of a typical masked panel, the student will list with 100% accuracy, the five materials used.	13.4	On the attached illustration, list 5 materials used in masking. 1._____ 2._____ 3._____ 4._____ 5._____

TPO 13.0 - AUTO BODY REPAIR AND REFINISHING

MASKING

1. Good quality masking paper will permit paint to seep through to the panel beneath.
   True or False

2. A masking paper dispenser will automatically apply masking tape to the edge of the paper.
   True or False

3. Should masking paper be applied to damp surfaces?
   Yes or No

4. Tape manufacturers caution against applying masking tape below what temperature.

   a. 75^{o} F.
   b. 50^{o} F.
   c. 32^{o} F.
   d. 20^{o} F.

5. Where should masking paper be stored?

   a. in refrigerator
   b. in a cool place
   c. on a heated radiator

6. When masking a windshield with two pieces of masking paper, which sheet of paper should be installed first?

   a. upper sheet
   b. lower sheet

7. When masking a wheel, or similiar circular area, what procedure should be followed?

   a. cut the paper in a circular form to fit the area
   b. pleat the paper into an apron

8. How should a radio antenna be masked?

   a. make a sleeve of masking
   b. wind the masking paper in a spiral manner around the antenna

9. To prepare an area for masking the area must be dry but cleaning is not necessary.
   True or False

TPO 13.0 (cont'd)

MASKING

10. Masking tapes must be capable of adhering to many surfaces, such as paint, chrome glass, and upholstery and should be easy to remove from the surface.
True or False

COURSE AUTOMOTIVE BODY REPAIR AND REFINISHING - BASIC

RMINAL PERFORMANCE
JECTIVE NO. 14.0

SURFACE PREPARATION

After the completion of a unit of instruction on surface preparation, 90% of the students will achieve an 80% score on a criterion test and demonstrate their ability by preparing a surface for spray painting with 80% accuracy as judged by the job rating sheet.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		14.0	Test attached
14.1	The student will select the proper grit sand paper for featheredging the surface with 100% accuracy.	14.1	1. Explain orally the purpose and methods of featheredging. 2. Select the grit sandpaper most suitable for featheredging: a. 40 grit b. 80 grit c. 100 grit
14.2	Given necessary information and materials the student will apply primer surfacer to a surface with 80% proficiency.	14.2	1. Primer surfaces are intended to provide adhesion to the metal and fill slight imperfections in the metal surface. True or False 2. Select the two general types of primer surfacer. a. lacquer base b. adhesion base c. synthetic base d. solvent base 3. It is generally not advisable to use a synthetic base primer surfacer under a lacquer finish. True or False 4. Lacquer base primer surfacer is generally advisable to use under all finishes. True or False 5. A primer surfacer should provide good adhesion to the surface and also good adhesion for the color coat. True or False 6. Sealers are used for sealing down sand scratches when recoating a lacquer or acrylic surface. True or False

COURSE AUTOMOTIVE BODY REPAIR AND REFINISHING - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 14.0 (cont'd) — SURFACE PREPARATION

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		14.2	7. Bleeder sealer is used for sealing reds, maroons, etc., so that they will not show through the top coat. True or False 8. Thinners and reducers are the same and are interchangeable. True or False 9. Primer surfacers should be reduced according to manufacturers instruction. True or False 10. Some manufacturers provide special thinner for use under conditions of different spraying temperatures. True or False
14.3	Given a tube of glazing putty, the student will with 80% accuracy apply glazing putty to a primed surface.	14.3	1. Explain orally the method of applying glazing putty. 2. Glazing putty is used for deep nicks and scratches. True or False 3. Glazing putty is applied in very thin coats. True or False 4. A rubber squeegee pad makes the best application for glazing putty. True or False

14.0 - AUTOMOTIVE BODY REPAIR AND REFINISHING - BASIC

SURFACE PREPARATION

1. Gasoline may be used to remove traces of wax and grease from the surface.
   True or False

2. Is a cloth that has been laundered satisfactory for removing wax and grease from the surface to be painted?
   Yes or No

3. What grit abrasive should be used for featheredging?

   a. 16 grit
   b. 24 grit
   c. 80 grit
   d. 220 grit
   e. 400 grit

4. If the original finish on a vehicle is lacquer, a maximum amount of sanding is required.
   True or False

5. Does a car finished with acrylic lacquer require more sanding than one finished in nitrocellulose lacquer?

   a. more
   b. less
   c. the same

6. What is glazing putty?

7. What is primer-surfacer?

8. Featheredging is not very important.
   True or False

9. Why must glazing putty be completely dry before sanding?

10. What is the function of primer-surfacer?

COURSE AUTOMOTIVE BODY REPAIR AND REFINISHING - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 15.0

CARE AND OPERATION OF SPRAY GUN EQUIPMENT

Upon completion of this unit 100% of the trainees will disassemble, clean and adjust a typical spray gun, service a typical air compressor and its component parts with 80% accuracy and correct response to a criterion test.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		15.0	Test attached
15.1	Given the diagram of a spray gun, the student will with 100% accuracy select the eight most important parts.	15.1	Select the eight most important parts of the spray gun. a. air nozzle or cap b. fluid nozzle or tip c. fluid needle valve d. trigger e. fluid control f. air valve g. pattern control (spreader valve) h. handle i. gun body j. needle valve packing nut
15.2	The student will with 80% accuracy clean a spray gun.	15.2	Identify in order the proper method to clean a spray gun. a. loosen spray cup and lift suction tube above the pain level b. unscrew the air nozzle about three turns, hold a cloth over the air cap and pull the trigger c. remove material from the cup,refill cup with about one inch of spray gun and equipment cleaner, put the cup on gun and tighten air nozzle d. pull trigger to flush out the material left in gun e. remove the nozzle, soak it in clean solvent then dry it with compressed air f. clean clogged holes with a broom straw or toothpick g. lubricate occasionally in accordance with the manufacturer's instructions

COURSE AUTOMOTIVE BODY REPAIR AND REFINISHING - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 15.0 (cont'd)

CARE AND OPERATION OF SPRAY GUN EQUIPMENT

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
15.3	Given diagram of the component parts of a typical air compressor installation, the student will properly connect components part with 80% proficiency.	15.3	1. The water that condenses in the reserve tank should be drained out everyday. True or False 2. The entire air system should be installed so as to be self draining. True or False 3. An air transformer is used to ensure a flow of clean air. True or False 4. An automatic water drain should not be used in the installation. True or False 5. The air compressor should be mounted in a level position. True or False 6. Explain air-line resistance. 7. To use the spray gun, connect the air hose and spray gun to the transformer, shut off the material adjustment on the spray gun, hold the spray gun trigger all the way (wide open) and adjust the air transformer to the desired pressure. True or False 8. Excessive air pressure _____ materials when spraying. 9. Insufficient air pressure will not supply enough velocity of air to properly _____ the more viscous materials. 10. The spray gun should be held about 6 to 8 inches from the work and adjusted by spraying against a piece of hanging paper. True or False

TPO 15.0 - AUTOMOTIVE BODY REPAIR AND REFINISHING - BASIC

CARE AND OPERATION OF SPRAY GUN EQUIPMENT

1. Explain the two adjustments located on the rear of a typical spray gun.

2. What is the purpose of the air transformer?

3. Explain what happens when the trigger is pulled on a spray gun.

4. A spray gun uses air to atomize the material being upgraded.
True or False

5. The spray gun with an air valve is known as a bleeder gun.
True or False

6. An external mix gun is usually used when refinishing an automobile.
True or False

7. The air cap is located at the front of the spray gun and directs the material stream into the compressed air to atomize it and form it into a spray.
True or False

8. A major advantage of a spray gun is that it is not necessary to clean it after each use.
True or False

9. If small holes in air cap become clogged, what should be used to clean them?

   a. wooden match stick
   b. wire nail
   c. fine wire as used for attaching tags

10. Should a spray gun be lubricated? Yes or No
If yes, what, when and why?

11. In a pressure fuel system the spray gun can be held at any angle.
True or False

12. Cooling fins of an air compressor should be kept clean.
True or False

13. A high quality air transformer will keep air pressure within what limits?

   a. 3/4 lb. variation
   b. 2 lb. variation
   c. 5 lb. variation

CARE AND OPERATION OF SPRAY GUN EQUIPMENT

14. Air hose used in painting is usually what color?

    a. red
    b. green
    c. black

15. Explain how a suction feed gun pulls the material out of the container.

RATING SCALE

1. Planning - 15%

   a. operation order
   b. selection of tools and materials
   c. use of trade knowledge

2. Product - 40%

   a. accuracy (freedom from mistakes)
   b. precision (adherence to limits)
   c. finish (as required)
   d. utilization of manuals (as required)

3. Work Habits - 30%

   a. cleanliness
   b. order
   c. care of tools
   d. safety
   e. economy of materials

4. Moral Attitude - 15%

   a. cooperation
   b. initiative
   c. dependability